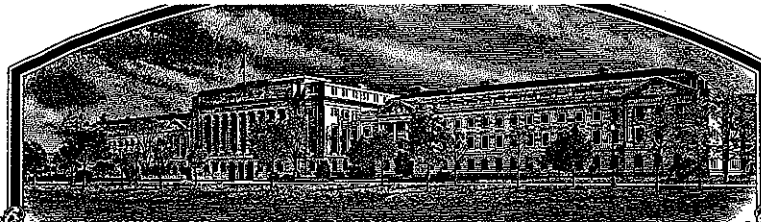


No.

200700409



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Michigan State University

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED DISTINCT VARIETY OF SEXUALLY REPRODUCED, OR TUBER PROPAGATED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF TWENTY YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, OR IMPORTING IT, OR EXPORTING IT, OR CONDITIONING IT FOR PROPAGATION, OR STOCKING IT FOR ANY OF THE FOREGOING PURPOSES, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. IN THE UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS SPECIFIED BY THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT, COMMON

'Red Ruby'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this seventh day of April, in the year two thousand and eight.

Attest:

[Signature]

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

[Signature]
Secretary

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995.

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF OWNER Michigan State University		2. TEMPORARY DESIGNATION OR EXPERIMENTAL NAME E1007R		3. VARIETY NAME Red Ruby	
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP Code, and Country) Executive Director, Office of Intellectual Property Michigan State University 2727 Alliance Drive Lansing, MI 48910		5. TELEPHONE (include area code) (517) 355-2186		FOR OFFICIAL USE ONLY PVPO NUMBER #200700409 FILING DATE August 14, 2007	
		6. FAX (include area code) (517) 432-3880			
7. IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION (corporation, partnership, association, etc.) Michigan constitutional corporation		8. IF INCORPORATED, GIVE STATE OF INCORPORATION		9. DATE OF INCORPORATION	
10. NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION. (First person listed will receive all papers) Michigan State University Office of Intellectual Property 2727 Alliance Drive Lansing, MI 48910				F E E S R E C E I V E D FILING AND EXAMINATION FEES: \$ 3652.00 @ 730.00 DATE 7/30/2007 @ 8/08/2008 CERTIFICATION FEE: \$ 768.00 DATE 3/25/08	
11. TELEPHONE (include area code) (517) 355-2186		12. FAX (include area code) (517) 432-3880		13. E-MAIL	
14. CROP KIND (Common Name) soft white winter wheat		16. FAMILY NAME (Botanical) Gramineae		18. DOES THE VARIETY CONTAIN ANY TRANSGENES? (OPTIONAL) <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF SO, PLEASE GIVE THE ASSIGNED USDA-APHIS REFERENCE NUMBER FOR THE APPROVED PETITION TO DEREGULATE THE GENETICALLY MODIFIED PLANT FOR COMMERCIALIZATION.	
15. GENUS AND SPECIES NAME OF CROP Triticum aestivum L.		17. IS THE VARIETY A FIRST GENERATION HYBRID? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO			
19. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse) a. <input checked="" type="checkbox"/> Exhibit A. Origin and Breeding History of the Variety b. <input checked="" type="checkbox"/> Exhibit B. Statement of Distinctness c. <input checked="" type="checkbox"/> Exhibit C. Objective Description of Variety d. <input type="checkbox"/> Exhibit D. Additional Description of the Variety (Optional) e. <input type="checkbox"/> Exhibit E. Statement of the Basis of the Owner's Ownership f. <input type="checkbox"/> Voucher Sample (2,500 viable untreated seeds or, for tuber propagated varieties, verification that tissue culture will be deposited and maintained in an approved public repository) g. <input type="checkbox"/> Filing and Examination Fee (\$3,652), made payable to "Treasurer of the United States" (Mail to the Plant Variety Protection Office)				20. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD AS A CLASS OF CERTIFIED SEED? (See Section 83(a) of the Plant Variety Protection Act) <input checked="" type="checkbox"/> YES (If "yes", answer items 21 and 22 below) <input type="checkbox"/> NO (If "no", go to item 23) 21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO IF YES, WHICH CLASSES? <input checked="" type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input type="checkbox"/> CERTIFIED 22. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS? <input type="checkbox"/> YES <input type="checkbox"/> NO IF YES, SPECIFY THE NUMBER 1,2,3, etc. FOR EACH CLASS. <input checked="" type="checkbox"/> FOUNDATION <input type="checkbox"/> REGISTERED <input checked="" type="checkbox"/> CERTIFIED (If additional explanation is necessary, please use the space indicated on the reverse.)	
23. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U. S. OR OTHER COUNTRIES? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. (Please use space indicated on reverse.)				24. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT (PLANT BREEDER'S RIGHT OR PATENT)? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. (Please use space indicated on reverse.)	
25. The owners declare that a viable sample of basic seed of the variety has been furnished with application and will be replenished upon request in accordance with such regulations as may be applicable, or for a tuber propagated variety a tissue culture will be deposited in a public repository and maintained for the duration of the certificate. The undersigned owner(s) is(are) the owner of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act. Owner(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.					
SIGNATURE OF OWNER 			SIGNATURE OF OWNER		
NAME (Please print or type) Michael R. Poterala			NAME (Please print or type) Michael R. Poterala		
CAPACITY OR TITLE Executive Director		DATE 6-26-07		CAPACITY OR TITLE Executive Director	
				DATE	

(See reverse for instructions and information collection burden statement)

GENERAL: To be effectively filed with the Plant Variety Protection Office (PVPO), **ALL** of the following items must be **received** in the PVPO: (1) Completed application form signed by the owner; (2) completed exhibits A, B, C, E; (3) for a seed reproduced variety at least 2,500 viable untreated seeds, for a hybrid variety at least 2,500 untreated seeds of each line necessary to **reproduce** the variety, or for tuber reproduced varieties verification that a viable (*in the sense that it will reproduce an entire plant*) tissue culture will be deposited and maintained in an approved public repository; (4) check drawn on a U.S. bank for \$3,652 (\$432 filing fee and \$3,220 examination fee), payable to "Treasurer of the United States" (See Section 97.6 of the Regulations and Rules of Practice.) Partial applications will be held in the PVPO for not more than 90 days, then returned to the applicant as unfilled. Mail application and other requirements to Plant Variety Protection Office, AMS, USDA, Room 401, NAL Building, 10301 Baltimore Avenue, Beltsville, MD 20705-2351. **Retain one copy for your files.** All items on the face of the application are self explanatory unless noted below. Corrections on the application form and exhibits must be initialed and dated. **DO NOT** use masking materials to make corrections. If a certificate is allowed, you will be requested to send a check payable to "Treasurer of the United States" in the amount of \$432 for issuance of the certificate. Certificates will be issued to owner, not licensee or agent.

Plant Variety Protection Office

Telephone: (301) 504-5518

FAX: (301) 504-5291

Homepage: <http://www.ams.usda.gov/science/pvpo/pvpindex.htm>

To avoid conflict with other variety names in use, the applicant must check the appropriate recognized authority and provide evidence that name has been cleared by the appropriate recognized authority before the Certificate of Protection is issued. For example, for agricultural and vegetable crops, contact: Seed Branch, AMS, USDA, 10301 Baltimore Avenue, Suite 401 NAL Building, Beltsville, MD 20705. Telephone: (301) 504-5682 <http://www.ams.usda.gov/lsg/seed.htm>.

ITEM

- 19a. Give: (1) the genealogy, including public and commercial varieties, lines, or clones used, and the breeding method;
(2) the details of subsequent stages of selection and multiplication;
(3) evidence of uniformity and stability; and
(4) the type and frequency of variants during reproduction and multiplication and state how these variants may be identified
- 19b. Give a summary of the variety's distinctness. Clearly state how this application variety may be distinguished from all other varieties in the same crop. If the new variety is most similar to one variety or a group of related varieties:
(1) identify these varieties and state all differences objectively;
(2) attach statistical data for characters expressed numerically and demonstrate that these are clear differences; and
(3) submit, if helpful, seed and plant specimens or photographs (prints) of seed and plant comparisons which clearly indicate distinctness.
- 19c. Exhibit C forms are available from the PVPO Office for most crops; specify crop kind. Fill in Exhibit C (Objective Description of Variety) form as completely as possible to describe your variety.
- 19d. Optional additional characteristics and/or photographs. Describe any additional characteristics that cannot be accurately conveyed in Exhibit C. Use comparative varieties as is necessary to reveal more accurately the characteristics that are difficult to describe, such as plant habit, plant color, disease resistance, etc.
- 19e. Section 52(5) of the Act requires applicants to furnish a statement of the basis of the applicant's ownership. An Exhibit E form is available from the PVPO.
20. If "Yes" is specified (*seed of this variety be sold by variety name only, as a class of certified seed*), the applicant **MAY NOT** reverse this affirmative decision after the variety has been sold and so labeled, the decision published, or the certificate issued. However, if "No" has been specified, the applicant may change the choice. (See Regulations and Rules of Practice, Section 97.103).
23. See Sections 41, 42, and 43 of the Act and Section 97.5 of the regulations for eligibility requirements.
24. See Section 55 of the Act for instructions on claiming the benefit of an earlier filing date.

22. CONTINUED FROM FRONT (Please provide a statement as to the limitation and sequence of generations that may be certified.)

Up to four generations of Foundation seed may be produced from breeder's seed, and up to 4 generations of Certified seed may be produced from Foundation seed.

23. CONTINUED FROM FRONT (Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)

24. CONTINUED FROM FRONT (Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)

E1007R is the result of a cross between Pioneer 2552 and Pioneer 2737W. Pioneer 2552 is protected by United States PVP 9300172, issued 09/30/1993. Pioneer 2727W is protected by United States PVP 9200159, issued 04/30/1993.

NOTES: It is the responsibility of the applicant/owner to keep the PVPO informed of any changes of address or change of ownership or assignment or owner's representative during the life of the application/certificate. The fees for filing a change of address; owner's representative; ownership or assignment; or any modification of owner's name is specified in Section 97.175 of the regulations. (See Section 101 of the Act, and Sections 97.130, 97.131, 97.175(h) of the Regulations and Rules of Practice.)

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 1.4 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, sexual orientation, marital or family status, political beliefs, parental status, or protected genetic information. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

EXHIBIT A
ORIGIN AND BREEDING HISTORY

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Red Ruby (experimental name MSU Line E1007R) is derived from a cross made in 1995 between Pioneer_2552/Pioneer_2737W. The F1 was increased in the greenhouse in 1995-96 and harvested in bulk without selection. The F2 seed was assigned a population number of 950435 and was planted in the fall of 1996 in a seven-row, solid seeded drill plot. The harvest of this drill plot was bulked and planted in the fall of 1997 as an F3 drill plot. The F3 drill plot was bulked and planted in the fall of 1998 as an F4 drill plot. Harvest of the F4 drill plot in 1999 consisted of selecting 23 heads and planting them as separate F5 headrows in the fall of 1999. In 2000, one F5 headrow was selected and bulk harvested. This bulk was used to plant one F6 six-row space planted plot with 7.5 inch seed spacing between plants in the fall of 2000. The 2001 harvest from the F6 plot consisted of single plant harvest of twelve plants, and bulk harvest of the remainder of the plot (01-Nursery Plot 121). In the fall of 2001, the twelve plants were planted in single plant derived space planted F7 plots (02-Nursery Plots 982-993) and the bulk was planted in the preliminary performance trials (02-MP035). The harvest in 2002 consisted of single plant harvest from eleven of the space planted plots, and bulking the remaining plants within those plots. In the fall of 2002, twenty single plant harvested plants were planted into single plant derived space planted F8 plots (03-plots 13-32), while the bulk was planted in the advanced and state performance trials (03-MP001 & 03-MP010). In 2003, individual plants were harvested from seventeen of the space planted plots, and the remaining plants in these plots were bulked. The bulk was planted as the F9 in the state performance trials (04-MP010) in the fall of 2003. Sixty-two individually harvested plants were planted as space planted plots in the fall of 2003. In 2004, two of the sixty-two space planted plots were selected, from which individual plants were harvested and the remainder of the plants in the plots were bulked. The other sixty (of the sixty-two) plots were bulked together. The bulk derived from two-plots was sent to Colorado for increase, which was planted as the F10 in the fall of 2004. The bulk derived from the sixty-two plots was planting in the state performance trials (05-MP010) in the fall of 2004. Seed harvested from Colorado in 2005 was planted as the F11 in the fall of 2005 in the state performance trial (06-MP010), and the remainder of the 2005 harvest was turned over to Michigan Crop Improvement as breeder seed.

The selection criteria from the F2 through the F7 involved visual field observations of plant height, powdery mildew resistance, leaf rust resistance, lodging, maturity, seed color, black point, and overall visual plant health and harvested grain health. From the F8 onward, the selection criteria also included yield, test weight, harvested grain moisture, and milling and baking qualities. From the F8 and beyond (4 generations observed up to 2005/06), Red Ruby exhibited uniformity and stability. However, variants and offtypes within the variety have been observed and recorded as follows:

Variants observed in Red Ruby during the 2005/06 growing season include the following:

	Percent Variants by Class	
	Breeder	Foundation
White Grain:	0.15%	0.20%

Offtypes observed in Red Ruby during the 2005/06 growing season include the following:

	Percent Offtypes by Class		
	Breeder	Foundation	Certified
Awnless White Chaffed:	0.01%	0.01%	0.05%
Awnless Bronze Chaffed:	0.01%	0.04%	0.06%
Extreme Talls:	0.04%	0.07%	0.09%
Awned Bronze Chaffed:	0.01%	0.04%	0.06%

EXHIBIT B STATEMENT OF DISTINCTNESS

Red Ruby (experimental MSU Line E1007R) is an awned, white chaffed, soft red winter wheat. Red Ruby is most similar to Hopewell. Red Ruby has a four year average height of 36.5 inches and is similar in height to Hopewell. Red Ruby has a four year average flowering date of 156.1 Julian calendar days, which is similar to Hopewell. The plant characteristics of Red Ruby include: At juvenile growth – a green (not red) coleoptile, semi-erect growth habit. At flowering - a yellow (not purple) anther. The auricles are glabrous. The flag leaf blade, flag leaf sheath, and the culm exhibit a waxy surface. The seed shape of Red Ruby is oval. Red Ruby is similar in lodging resistance to Hopewell. Specific differences between Red Ruby and Hopewell are:

The plant of Red Ruby is white chaffed when mature whereas the plant characteristic of Hopewell at maturity is red chaffed.

Red Ruby is an awned wheat, whereas Hopewell is apically awnletted.

Specific genetic differences between MSU Line E1007 and Hopewell were NOT obtained.

SUPPORTING DATA (Table 1):

The supporting data included is from the Michigan State Wheat Performance Trials which includes four years of single year, multi-location averages from the 2003-06 growing seasons. Details of each trial year can be found outlined below and more specific location detail can be obtained from the Appendix Tables from 2006(A), 2005(B), 2004(C), and 2003(D) which are attached. Tables contain only those treatments (entries) which are relevant for the purpose of this description. However, the averages and statistical parameters in these tables are based on the entire set of evaluated treatments for each year. Tables also include the total number of locations, and the total number of replications that were observed for each agronomic trait, for each growing year. Disease and lodging resistance claims (scores) are based on visual comparison observations scores and are based on a 0-9 scale, where 0 = none. Data on Fusarium head blight (scab) were obtained from a misted and inoculated scab screening nursery. The scab nursery was inoculated (from lab-produced infected grain spread onto the field), and artificial misting was employed throughout the entire flowering period. Field symptom data reported here are based on: 1) the percent of spikes showing any scabby spikelets; 2) the percent of scabby spikelets within infected spikes; and 3) the percent of scabby spikelets considering all spikes (scab index). The scab index is a measure of the extent of damage to entire plots due to scab infection. Data of deoxynivalenol (DON), a mycotoxin produced from Fusarium head blight, are from harvested grain in the inoculated, mist irrigated, scab screening nursery. DON data are presented in parts per million (ppm).

2006 Michigan State Wheat Performance Trials data (68 treatments/entries observed):

Trial was planted at eight sites throughout Michigan's soft winter wheat growing regions.

Six of those sites were designed and executed as four replication alpha-lattice design. Plots were six rows spaced 7.5 inches apart and were 12 feet in length. They were planted to a density of 2 million seeds per acre. All data presented is based upon the entire plot from these six sites (Huron, Ingham, Lenawee, Midland, Saginaw, and Sanilac Counties).

A single site was designed as a two replication RCB mainly for observation. Planting and seed density were the same as indicated above (Ingham County Observation).

Another site was inoculated (from lab-produced infected grain spread onto the field), and artificially misted to stimulate Fusarium Head Blight infections. This site was a four replication RCB design. Plots were planted as single rows 15 inches apart and were 5 feet in length. They were planted to a density of 836 thousand seeds per acre. All data presented on Fusarium Head Blight is based upon the entire plot from this site (Ingham Scab Nursery).

EXHIBIT B (continued)
STATEMENT OF DISTINCTNESS

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All of the statistical analysis for the data presented in the tables was performed by Residual Maximum Likelihood Model (REML 3.4) which is appropriate for the design used. The average means as well as the LSD (p-value of 0.05) are presented.

2005 Michigan State University State Performance Trial data (90 treatments/entries observed):

Trial was planted at eight sites throughout Michigan's soft winter wheat growing regions. Six of those sites were designed and executed as four replication alpha-lattice design. Plots were six rows spaced 7.5 inches apart and were 12 feet in length. They were planted to a density of 2 million seeds per acre. All data presented is based upon the entire plot from these six sites (Huron, Ingham, Lenawee, Midland, Saginaw, and Sanilac Counties). A single site was designed as a two replication RCB mainly for observation. Planting and seed density were the same as indicated above (Ingham County Observation). Another site was inoculated (from lab-produced infected grain spread onto the field), and artificially misted to stimulate Fusarium Head Blight infections. This was designed and executed as four replication alpha-lattice design. Plots were planted as single rows 15 inches apart and were 4 feet in length. They were planted to a density of 836 thousand seeds per acre. All data presented on Fusarium Head Blight is based upon the entire plot from this site (Ingham Scab Nursery). All of the statistical analysis for the data presented in the tables was performed by Residual Maximum Likelihood Model (REML 3.4) which is appropriate for the design used. The average means as well as the LSD (p-value of 0.05) are presented.

2004 Michigan State University State Performance Trial data (84 treatments/entries observed):

Trial was planted at eight sites throughout Michigan's soft winter wheat growing regions. Six of those sites were designed and executed as four replication alpha-lattice design. Plots were seven rows spaced 6 inches apart and were 12 feet in length. They were planted to a density of 1.8 million seeds per acre. All data presented is based upon the entire plot from these six sites (Clinton, Ingham, Lenawee, 2-Saginaw, and Sanilac Counties). One replication was planted at a single site mainly for observation. Planting and seed density were the same as indicated above (Ingham County Observation). Another site was inoculated (from lab-produced infected grain spread onto the field), and artificially misted to stimulate Fusarium Head Blight infections. This was designed and executed as a three replication randomized complete block. Plots were seven rows spaced 6 inches apart and were 12 feet in length. They were planted to a density of 1.8 million seeds per acre. All data presented on Fusarium Head Blight is based upon the entire plot from this site (Ionia Scab Nursery). All of the statistical analysis for the data presented in the tables was performed by Residual Maximum Likelihood Model (REML 3.4) which is appropriate for the design used. The average means as well as the LSD (p-value of 0.05) are presented.

2003 Michigan State University State Performance Trial data (64 treatments/entries observed):

Trial was planted at six sites throughout Michigan's soft winter wheat growing regions. Five of those sites were designed and executed as four replication alpha-lattice design. Plots were seven rows spaced 6 inches apart and were 12 feet in length. They were planted to a density of 1.8 million seeds per acre. All data presented is based upon the entire plot from these five sites (Ingham, Lenawee, 2-Saginaw, and Sanilac Counties).

EXHIBIT B (continued)
STATEMENT OF DISTINCTNESS

200700 409

Another site was inoculated (from lab-produced infected grain spread onto the field), and artificially misted to stimulate Fusarium Head Blight infections. This was designed and executed as a three replication alpha-lattice design. Plots were seven rows spaced 6 inches apart and were 12 feet in length. They were planted to a density of 1.8 million seeds per acre. All data presented on Fusarium Head Blight is based upon the entire plot from this site (Ionia Scab Nursery). All of the statistical analysis for the data presented in the tables was performed by Residual Maximum Likelihood Model (REML 3.4) which is appropriate for the design used. The average means as well as the LSD (p-value of 0.05) are presented.

* Please refer to the Appendix Tables to see specific year and location information and the field data obtained during each growing season.

2006 Michigan State University Wheat Performance Trials

Appendix A. Trial Site Descriptions for 2006 MSU Wheat Performance Trials.

	HURON COUNTY	YIELD TRIAL	INGHAM COUNTY OBSERVATION	SCAB NURSERY	LENAWEE COUNTY	MIDLAND COUNTY	SANILAC COUNTY	SAGINAW COUNTY
COOPERATOR	DARWIN SNELLER	TIM DIETZ	MICHIGAN STATE UNIVERSITY	MICHIGAN STATE UNIVERSITY	WOODS SEED FARM	FRED SILER	STOUGHTENBURG FARMS	STUART BIERLEIN
NEAREST CITY	SEBEWAING	WILLIAMSTON	MASON	EAST LANSING	BRITTON	LAPORTE	SANDUSKY	GERA
PLANTING DATE	OCT. 5, 2005	OCT. 1, 2005	OCT. 10, 2005	OCT. 12, 2005	SEPT. 30, 2005	SEPT. 24, 2005	SEPT. 25, 2005	OCT. 4, 2005
HARVEST DATE	July 17, 2006	N/A	N/A	N/A	July 10, 2006	July 15, 2006	July 16, 2006	July 14, 2006
PRE-PLANT FERTILIZER	NONE	150# 6-24-24	150# 6-24-24	150# 6-24-24	300# 9-23-30	250# 6-15-36	190# 8-15-30 +3.7% S	300# 6-11-35 +1%Mn+0.3Cu +0.3Zn
COMMENTS	Light to Moderate Leaf Rust	Light Powdery Mildew; Moderate Leaf Blotch Pressure, Moderate Wheat Spindle Streak Mosaic Virus Atypical Lodging: Did Not Harvest	Observation Site / Yield Not Taken	Inoculated / Misted Scab Screening Nursery	Moderate to Heavy Leaf Rust Early; Moderate Lodging; No-tilled	Light to Moderate Leaf Rust Pressure Late	Light to Moderate Leaf Rust, Light to Moderate Lodging	Light to Moderate Leaf Rust
AVERAGE YIELD (BUSHELS / ACRE)	77.6	N/A	N/A	N/A	79.6	101.7	104.7	90.9
AVERAGE TEST WEIGHT (LBS. / BUSHEL)	57.0	N/A	N/A	N/A	58.4	57.8	56.9	56.8
AVERAGE PERCENT GRAIN MOISTURE	14.0	N/A	N/A	N/A	14.0	13.6	17.5	16.4
DATA RECORDED (NUMBER OF REPS)	LRUST (2)	PL_HT (3); WSSV (2); PM (2); STRI (2)	FD (2)	FHB% (2); FHBX (2)	LODGE (4); LRUST (2); PL_HT (2)	LODGE (4); LRUST (2); PL_HT (4); FD (4); PM (2); STRI (2); SPROUT (4);	LODGE (3)	LODGE (4); SPROUT (4)

*OTHER DATA: FD - Flowering Date (Days Past Jan. 01), PL_HT - Plant Height in Inches, SPROUT - In-Head Pre-Harvest Sprouting Score (0-9), LODGE - Lodging Score (0-9), LRUST - Leaf Rust Score (0-9), STRI - Stagonospora tritici (Leaf Blotch) Score (0-9), PM - Powdery Mildew Score (0-9), WSSV - Wheat Spindle Streak Mosaic Score (0-9), FHB% - Fusarium Head Blight Incidence Percent (0-100%), FHBX - Fusarium Head Blight Severity Percent (0-100%), FHBX - Fusarium Head Blight Severity Index

** SCORING INFORMATION: Score of 0 = Best Rating - Score of 9 = Poor Rating

200700409

2005 Michigan State University Wheat Variety Trials

Appendix B. Trial Site Descriptions for 2005 MSU Wheat Variety Trials.

	HURON COUNTY	YIELD TRIAL	INGHAM COUNTY OBSERVATION	SCAB NURSERY	LENAWEE COUNTY	MIDLAND COUNTY	SANILAC COUNTY	SAGINAW COUNTY
COOPERATOR	DARWIN SNELLER	TIM DIETZ	MICHIGAN STATE UNIVERSITY	MICHIGAN STATE UNIVERSITY	WOODS SEED FARM	FRED SILER	STOUGHTENBURG FARMS	STUART BIERLEIN
NEAREST CITY	SEBEWAING	WILLIAMSTON	MASON	EAST LANSING	BRITTON	LAPORTE	SANDUSKY	GERA
PLANTING DATE	10/11/04	10/03/04	10/06/04	10/08/05	09/30/04	10/05/04	10/01/04	09/29/04
HARVEST DATE	07/23/05	07/12/05	N/A	N/A	07/11/05	07/17/05	07/21/05	07/20/05
PRE-PLANT FERTILIZER	225# 6-17-34	200# 6-24-24	200# 6-24-24	200# 6-24-24	300# 9-23-30	250# 10-12-36 +1% Mn	190# 8-15-30 +3.7% S	300# 6-11-35 +1%Mn+0.3Cu +0.3Zn
COMMENTS	Light Scab Pressure; Moderate Leaf Blotch Pressure	Light to Moderate Powdery Mildew; Moderate Leaf Blotch Pressure	Observation Site / Yield Not Taken		Light to Moderate Powdery Mildew Early Moderate Leaf Rust Pressure Late; Moderate Leaf Blotch Pressure	Light Leaf Rust Pressure Late; Moderate Leaf Blotch Pressure	Light to Moderate Winter Kill (Injury); Light to Moderate Powdery Mildew Early; Moderate Leaf Blotch Pressure	Light to Moderate Winter Kill (Injury); Light to Moderate Powdery Mildew Early; Moderate Leaf Blotch Pressure
AVERAGE YIELD (BUSHEL / ACRE)	81.9	66.3	N/A	N/A	79.1	80.2	81.0	91.5
AVERAGE TEST WEIGHT (LBS. / BUSHEL)	58.5	60.4	N/A	N/A	59.5	60.4	56.1	58.5
AVERAGE PERCENT GRAIN MOISTURE	14.2	13.1	N/A	N/A	11.2	15.5	12.5	15.4
DATA RECORDED (NUMBER OF REPS)	STRI (2)	PL_HT (4); PM (2);	SPROUT (2); FD (1); W_KIL (1)	FHB% (4); FHBX (4)	LRUST (2); PM (2); STRI (2)	LRUST (1); PL_HT (3); FD (4); SPROUT (3)	LODGE (4); STRI (2); W_KIL (4)	W_KIL (4); SPROUT (3)

*OTHER DATA: FD - Flowering Date (Days Past Jan. 01); PL_HT - Plant Height in Inches; SPROUT - In-Head Pre-Harvest Sprouting Score (0-9); LODGE - Lodging Score (0-9); LRUST - Leaf Rust Score (0-9); STRI - Stagonospora tritici (Leaf Blotch) Score (0-9); PM - Powdery Mildew Score (0-9); W_KIL - Winter Kill (Injury) Score (0-9); FHB% - Fusarium Head Blight Incidence Percent (0-100%); FHBX - Fusarium Head Blight Severity Index

** SCORING INFORMATION: Score of 0 = Best Rating - Score of 9 = Poor Rating

2

2004 Michigan State University Wheat Variety Trials

Appendix C. Trial Site Descriptions for 2004 MSU Wheat Variety Trials.

	CLINTON COUNTY	YIELD TRIAL	INGHAM COUNTY	LENAWEE COUNTY	SANILAC COUNTY	SAGINAW COUNTY (1)	SAGINAW COUNTY (2)	IONIA COUNTY
COOPERATOR	ROGER GABLE	OESTERLE BROTHERS	MICHIGAN STATE UNIVERSITY	WOODS SEED FARM	STOUGHTENBURG FARMS	STUART BIERLEIN	FRED SILER	MSU CLARKSVILLE RESEARCH STATION
NEAREST CITY	MIDDLETON	MASON	MASON	BRITTON	SANDUSKY	GERA	MERRILL	CLARKSVILLE
PLANTING DATE	10/08/03	10/09/03	10/10/03	10/11/03	10/01/03	09/29/03	09/30/03	10/13/03
HARVEST DATE	07/20/04	07/14/04		07/13/04	07/23/04	07/21/04	07/19/04	
PRE-PLANT FERTILIZER	200 # 10-26-26	350# 6-24-24	200# 6-24-24	250#6-22-22	150# 10-20-20+200# Potash	300# 5-13-33+1%Mg+0.4Cu	200# 10-12-13+1%Mn+100#Gyp+10#Cu	250# 19-19-20
COMMENTS	moderate to heavy scab pressure, depending on flowering date; heavy leaf blotch pressure	moderate to heavy scab pressure, depending on flowering date; heavy leaf blotch pressure	unreplicated observation site	extremely heavy, uniform scab pressure; heavy leaf blotch pressure	low disease pressure	light to moderate scab pressure, depending on flowering date; moderate leaf blotch pressure	light to moderate scab pressure, depending on flowering date; moderate leaf blotch pressure	Mist irrigated and scab inoculated
AVERAGE YIELD (BUSHELS / ACRE)	70.0	57.9	N / A	59.5	84.2	91.4	73.7	N / A
AVERAGE TEST WEIGHT (LBS. / BUSHEL)	55.2	54.7	N / A	52.5	59.6	59.2	58.7	N / A
AVERAGE PERCENT GRAIN MOISTURE	16.6	14.5	N / A	13.7	16.4	16.2	17.8	N / A
OTHER DATA (NUMBER OF REPS)	SEPT (2)	PLHT (4); SPROUT (2)	SPROUT (1)	PLHT (4); SEPT (2); FHB (3); FHBX (3); FHBX (1)			FD (3); SPROUT (4); PM (3)	FD (2); FHB (3); FHBX (3)

*OTHER DATA: FD - Flowering Date, PLHT - Plant Height in Inches, SPROUT - In-Head Pre-Harvest Sprouting Score (0-9), SEPT - Septoria Score (0-9), PM - Powdery Mildew Score (0-9), FHB - Fusarium Head Blight Incidence Score (0-9), FHBX - Fusarium Head Blight Severity Score (0-9), FHBX - Fusarium Head Blight Index

Appendix D. Trial Site Descriptions for 2003 MSU Wheat Variety Trials.

	Ingham County	Ionia County	Lenawee County	Sanilac County	Saginaw County #1	Saginaw County #2
Cooperator	Oesterle Brothers	Michigan State University	Woods Seed Farm	Stoughtenburg Farms	Stuart Bierlein	Fred Siler
Nearest City	Mason	Clarksville	Britton	Sandusky	Gera	Merrill
Date planted	09/30/02	10/17/02	10/09/02	09/27/02	09/28/02	10/01/02
Date harvested	07/23/03	07/31/03	07/20/03	07/29/03	07/25/03	07/27/03
Pre-Plant Fertilizer	350# 6-24-24	150# 46-0-0	250# 6-15-30+ 1%Mg+2.3%S+ 3%C	200# Potash + 150# 10-20-20	300# 5-13-33+ 1% Mg+0.4Cu	200# 10-13-36+ 1%Mn
Comments	Low disease	Mist irrigated	Very heavy foliar and head disease pressure		Low disease pressure	Low disease pressure
Avg. yield (bu/acre)	85.7	N / A	79.3	94.6	94.3	89.9
Avg. test weight (lbs/bu)	60.2	N / A	59.3	59.0	59.5	59.0
Avg. grain moisture (%)	14.4	N / A	14.9	17.0	13.4	14.4
Other data (# of reps)*	PltHt (4), WSSV (3), FD (3), SPROUT (4)	FD (1), Sept. (1), PMF% (1)	LRust (1), Sept. (1), WSMV (1), SRst (1)	Lod (4)	LRust (1), Lod (4)	PltHt (4), FD (4), SPROUT (4)

* FD – Flowering Date, LRust – Leaf Rust Score, Lod – Lodging Score, PltHt – Plant Height in Inches, PMF% – Percentage of Flag Leaf Covered with Powdery Mildew, SPROUT – In-Head Pre-Harvest Sprouting Score, Sept. – Septoria Score, SRust – Stripe Rust Score, WSSV – Wheat Spindle Streak Virus Score, WSMV – Wheat Streak Mosaic Virus Score

200700409

Table 1: Single year, multi-location averages from the 2003-06 growing seasons.

200700409

NAME	Lodging Score (0-9); (0=none)				Flowering Date (Days Past Jan. 1)				Plant Height (Inches from the ground to the top of head)			
	2006	2005	2004	2003	2006	2005	2004	2003	2006	2005	2004	2003
Red Ruby	3.0	2.0	-----	3.4	150.8	155.5	151.7	166.3	41.4	32.8	34.6	37.2
Hopewell	2.1	1.8	-----	2.2	150.0	155.5	153.0	166.3	41.1	34.1	33.4	37.0
# LOCATIONS OBSERVED	4	1	0	2	2	2	2	3	3	2	2	2
# REPLICATIONS OBSERVED	15	4	0	8	6	5	5	8	9	7	8	8
TRIAL MEAN	4.3	3.1	-----	4.2	149.8	155.0	152.6	165.3	40.8	33.5	33.7	37.5
LSD (0.05)	1.6	1.1	-----	1.6	0.9	1.2	2.0	2.0	1.4	1.6	1.4	1.6
CV (%)	26.6	23.3	-----	19.1	0.9	1.1	1.9	1.9	2.1	2.4	2.1	2.1

NAME	Leaf Rust Score (0-9); (0=none)				Powdery Mildew Score (0-9); (0=none)				Leaf Blotch Score (0-9); (0=none)			
	2006	2005	2004	2003	2006	2005	2004	2003	2006	2005	2004	2003
Red Ruby	3.3	3.5	-----	2.5	2.9	2.4	1.3	-----	1.3	4.7	5.3	4.5
Hopewell	5.7	2.0	-----	4.5	2.9	1.7	1.7	-----	1.6	3.7	5.1	4.5
# LOCATIONS OBSERVED	3	2	0	2	2	2	1	0	2	3	2	2
# REPLICATIONS OBSERVED	6	3	0	2	4	4	3	0	4	6	4	2
TRIAL MEAN	4.1	2.4	-----	3.5	2.3	3.1	2.2	-----	2.2	4.2	4.9	5.4
LSD (0.05)	1.8	2.2	-----	4.0	1.3	1.9	1.7	-----	1.1	1.6	1.5	3.3
CV (%)	26.8	46.1	-----	56.3	27.9	30.8	46.1	-----	23.5	24.0	15.4	30.2

NAME	Wheat Spindle Streak Mosaic Virus Score (0-9); (0=none)				Winter Kill Score (0-9); (0=none)				In Head Sprouting Score (0-9); (0=none)			
	2006	2005	2004	2003	2006	2005	2004	2003	2006	2005	2004	2003
Red Ruby	1.0	-----	-----	1.0	-----	1.1	-----	-----	3.4	4.1	3.7	2.7
Hopewell	1.0	-----	-----	1.0	-----	1.3	-----	-----	2.8	1.8	1.5	1.1
# LOCATIONS OBSERVED	1	0	0	1	0	3	0	0	2	3	3	2
# REPLICATIONS OBSERVED	2	0	0	3	0	9	0	0	8	8	7	8
TRIAL MEAN	3.3	-----	-----	2.2	-----	1.8	-----	-----	5.6	6.1	6.0	5.7
LSD (0.05)	3.1	-----	-----	2.8	-----	1.6	-----	-----	1.6	2.1	2.2	2.1
CV (%)	45.3	-----	-----	62.9	-----	55.5	-----	-----	14.4	20.9	22.7	18.3

NAME	Fusarium Head Blight (Scab) Data : Field Observation Symptoms											
	Incidence (% of spikes)				Severity (% within spikes)				Index (% overall infection)			
	2006	2005	2004	2003	2006	2005	2004	2003	2006	2005	2004	2003
Red Ruby	30.0	60.7	100.0	-----	25.0	40.4	59.4	-----	7.5	24.4	59.4	-----
Hopewell	60.0	46.7	96.5	-----	40.0	33.2	47.0	-----	24.0	19.0	45.3	-----
# LOCATIONS OBSERVED	1	1	2	0	1	1	2	0	1	1	2	0
# REPLICATIONS OBSERVED	2	4	6	0	2	4	6	0	2	4	6	0
TRIAL MEAN	41.5	66.5	97.2	-----	41.2	36.8	51.4	-----	18.1	25.0	50.5	-----
LSD (0.05)	21.7	22.1	9.2	-----	16.4	24.0	28.4	-----	16.0	18.7	29.6	-----
CV (%)	26.2	20.8	4.5	-----	20.0	40.1	26.3	-----	44.0	45.7	27.9	-----

NAME	Deoxynivalenol (DON) ppm				Black Point Percent of Seed Infection			
	2006	2005	2004	2003	2006	2005	2004	2003
Red Ruby	2.0	3.4	5.0	-----	7.9	11.7	-----	-----
Hopewell	2.2	3.7	4.5	-----	3.2	2.8	-----	-----
# LOCATIONS OBSERVED	1	1	1	0	3	4	3	-----
# REPLICATIONS OBSERVED	2	2	2	0	3	4	3	-----
TRIAL MEAN	3.1	3.1	7.2	-----	10.4	15.2	49.7	-----
LSD (0.05)	2.0	4.1	3.3	-----	9.2	10.0	18.8	-----
CV (%)	32.1	58.3	23.2	-----	54.8	47.1	21.5	-----

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**U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MD 20705**

Exhibit C

**OBJECTIVE DESCRIPTION OF VARIETY
Wheat (*Triticum* spp.)**

NAME OF APPLICANT (S) Michigan State University - CSS Dept Rick Ward and Lee Siler	TEMPORARY OR EXPERIMENTAL DESIGNATION MSU Line E1007R	VARIETY NAME Red Ruby
ADDRESS (Street and No. or RD No., City, State, Zip Code and Country) 246 Administration Building East Lansing, MI 48824-1046		<div style="background-color: #cccccc; padding: 2px;">FOR OFFICIAL USE ONLY</div> PVPO NUMBER <div style="font-size: 2em; font-weight: bold;">#200700409</div>

PLEASE READ ALL INSTRUCTIONS CAREFULLY:

Place the appropriate number that describes the varietal character of this variety in the boxes below. Place a zero in the first box (e.g., 099 or 09) when number is either 99 or less or 9 or less respectively. Data for quantitative plant characters should be based on a minimum of 100 plants. Comparative data should be determined from varieties entered in the same trial. Royal Horticultural Society or any recognized color standard may be used to determine plant colors; designate system used: _____ Please answer all questions for your variety; lack of response may delay progress of your application.

1. KIND:

- 1

1 = Common
2 = Durum
3 = Club
4 = Other (Specify) _____

2. VERNALIZATION:

- 2

1 = Spring
2 = Winter
3 = Other (Specify) _____

3. COLEOPTILE ANTHOCYANIN:

- 1

1 = Absent
2 = Present

4. JUVENILE PLANT GROWTH:

- 2

1 = Prostrate
2 = Semi-erect
3 = Erect

5. PLANT COLOR: (boot stage)

- 2

1 = Yellow-Green
2 = Green
3 = Blue-Green

6. FLAG LEAF: (boot stage)

- 2

1 = Erect
2 = Recurved
- 1

1 = Not Twisted
2 = Twisted
- 2

1 = Wax Absent
2 = Wax Present

7. EAR EMERGENCE:

- 1

5

4

Number of Days (Average)
- Number of Days Earlier Than

* _____
* Hopewell
- 0

2

Number of Days Later Than

* Pioneer 25R47 and Bravo
*Relative to a PVPO-Approved Commercial Variety Grown in the Same Trial

8. ANTHOR COLOR:

- 1

1 = Yellow
2 = Purple

12

9. PLANT HEIGHT: (from soil to top of head, excluding awns)

9 2 7

cm (Average)

7 6

cm Taller Than

Pioneer 25R47 *

Same As

Hopewell *

2 5

cm Shorter Than

Bravo *

10. STEM:**A. ANTHOCYANIN**

1

1 = Absent 2 = Present

B. WAXY BLOOM

2

1 = Absent 2 = Present

C. HAIRINESS (last internode of rachis)

2

1 = Absent 2 = Present

D. INTERNODE

3

1 = Hollow 2 = Semi-solid 3 = Solid

4

Number of Nodes

E. PEDUNCLE

3

1 = Erect 2 = Recurved 3 = Semi-erect

1 7

cm Length

F. AURICLE

1

Anthocyanin: 1 = Absent 2 = Present

2

Hair: 1 = Absent 2 = Present

11. HEAD: (At Maturity)**A. DENSITY**

2

1 = Lax
2 = Middense (Laxidense)
3 = Dense**B. SHAPE**

2

1 = Tapering
2 = Strap
3 = Clavate
4 = Other (Specify) _____**C. CURVATURE**

2

1 = Erect
2 = Inclined
3 = Recurved**D. AWNEDNESS**

4

1 = Awnless
2 = Apically Awnletted
3 = Awnletted
4 = Awned**12. GLUMES: (At Maturity)****A. COLOR**

1

1 = White
2 = Tan
3 = Other (Specify) _____**B. SHOULDER**

2

1 = Wanting 2 = Oblique
3 = Rounded 4 = Square
5 = Elevated 6 = Apiculate
7 = Other (Specify) _____**C. SHOULDER WIDTH**

2

1 = Narrow
2 = Medium
3 = Wide**D. BEAK**

2

1 = Obtuse
2 = Acute
3 = Acuminate**E. BEAK WIDTH**

2

1 = Narrow
2 = Medium
3 = Wide**F. GLUME LENGTH**

2

1 = Short (ca. 7mm)
2 = Medium (ca. 8mm)
3 = Long (ca. 9mm)**G. WIDTH**

2

1 = Narrow (ca. 3mm)
2 = Medium (ca. 3.5mm)
3 = Long (ca. 4mm)

13. SEED:

A. SHAPE

- ☐ 2 1 = Ovate
2 = Oval
3 = Elliptical

B. CHEEK

- ☐ 1 1 = Rounded
2 = Angular

C. BRUSH

- ☐ 2 1 = Short 1 = Not Collared
2 = Medium 2 = Collared
3 = Long

D. CREASE

- ☐ 1 1 = Width 60% or less of Kernel
2 = Width 80% or less of Kernel
3 = Width Nearly as Wide as Kernel

- ☐ 1 1 = Depth 20% or less of Kernel
2 = Depth 35% or less of Kernel
3 = Depth 50% or less of Kernel

E. COLOR

- ☐ 3 1 = White
2 = Amber
3 = Red
4 = Other (Specify) _____

F. TEXTURE

- ☐ 2 1 = Hard
2 = Soft
3 = Other (Specify) _____

G. PHENOL REACTION (See Instructions)

- ☐ 1 = Ivory 4 = Dark Brown
2 = Fawn 5 = Black
3 = Light Brown

H. SEED WEIGHT

- ☐ 3 ☐ 3 g/1000 Seed (Whole number only)

I. GERM SIZE

- ☐ 2 1 = Small
2 = Midsize
3 = Large

14. DISEASE: PLEASE INDICATE THE SPECIFIC RACE OR STRAIN TESTED

(0 = Not Tested 1 = Susceptible 2 = Resistant 3 = Intermediate 4 = Tolerant)

- | | |
|---|---|
| <input type="checkbox"/> 0 Stem Rust (<i>Puccinia graminis</i> f. sp. <i>tritici</i>) | <input type="checkbox"/> 3 Leaf Rust (<i>Puccinia recondita</i> f. sp. <i>tritici</i>) |
| <input type="checkbox"/> 0 Stripe Rust (<i>Puccinia striiformis</i>) | <input type="checkbox"/> 0 Loose Smut (<i>Ustilago tritici</i>) |
| <input type="checkbox"/> 0 Tan Spot (<i>Pyrenophora tritici-repentis</i>) | <input type="checkbox"/> 0 Flag Smut (<i>Urocystis agropyri</i>) |
| <input type="checkbox"/> 0 Halo Spot (<i>Selenophoma donacis</i>) | <input type="checkbox"/> 0 Common Bunt (<i>Tilletia tritici</i> or <i>T. laevis</i>) |
| <input type="checkbox"/> 0 <i>Septoria nodorum</i> (Glume Blotch) | <input type="checkbox"/> 0 Dwarf Bunt (<i>Tilletia controversa</i>) |
| <input type="checkbox"/> 0 <i>Septoria avenae</i> (Speckled Leaf Disease) | <input type="checkbox"/> 0 Karnal Bunt (<i>Tilletia indica</i>) |
| <input type="checkbox"/> 1 <i>Septoria tritici</i> (Speckled Leaf Blotch) | <input type="checkbox"/> 1 Powdery Mildew (<i>Erysiphe graminis</i> f. sp. <i>tritici</i>) |
| <input type="checkbox"/> 1 Scab (<i>Fusarium</i> spp.) | <input type="checkbox"/> 0 "Snow Molds" |
| <input type="checkbox"/> 3 "Black Point" (Kernel Smudge) | <input type="checkbox"/> 0 Common Root Rot (<i>Fusarium</i> , <i>Cochliobolus</i> and <i>Bipolaris</i> spp.) |
| <input type="checkbox"/> 0 Barley Yellow Dwarf Virus (BYDV) | <input type="checkbox"/> 0 Rhizoctonia Root Rot (<i>Rhizoctonia solani</i>) |
| <input type="checkbox"/> 0 Soilborne Mosaic Virus (SBMV) | <input type="checkbox"/> 0 Black Chaff (<i>Xanthomonas campestris</i> pv. <i>translucens</i>) |
| <input type="checkbox"/> 3 Wheat Yellow (Spindle Streak) Mosaic Virus | <input type="checkbox"/> 0 Bacterial Leaf Blight (<i>Pseudomonas syringae</i> pv. <i>syringae</i>) |
| <input type="checkbox"/> 0 Wheat Streak Mosaic Virus (WSMV) | <input type="checkbox"/> Other (Specify) _____ |
| <input type="checkbox"/> Other (Specify) _____ | <input type="checkbox"/> Other (Specify) _____ |
| <input type="checkbox"/> Other (Specify) _____ | <input type="checkbox"/> Other (Specify) _____ |
| <input type="checkbox"/> Other (Specify) _____ | <input type="checkbox"/> Other (Specify) _____ |

15. INSECT: (0 = Not Tested 1 = Susceptible 2 = Resistant 3 = Intermediate 4 = Tolerant)

PLEASE SPECIFY BIOTYPE (where needed)

- | | |
|--|--|
| <input type="checkbox"/> 0 Hessian Fly (<i>Mayetiola destructor</i>) | <input type="checkbox"/> Other (Specify) _____ |
| <input type="checkbox"/> 0 Stem Sawfly (<i>Cephus</i> spp.) | <input type="checkbox"/> Other (Specify) _____ |
| <input type="checkbox"/> 0 Cereal Leaf Beetle (<i>Oulema melanopa</i>) | <input type="checkbox"/> Other (Specify) _____ |

15. INSECT: (continued) 0 = Not Tested 1 = Susceptible 2 = Resistant 3 = Intermediate 4 = Tolerant

PLEASE SPECIFY BIOTYPE (Where Needed)






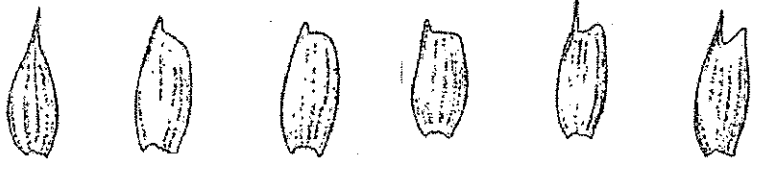


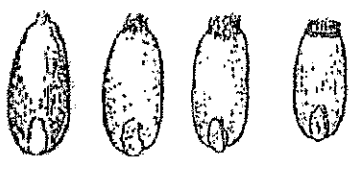
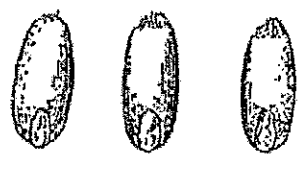



<input type="checkbox"/> 0	Russian Aphid (<i>Diuraphis noxia</i>)	<input type="checkbox"/>	Other (Specify) _____
<input type="checkbox"/> 0	Greenbug (<i>Schizaphis graminum</i>)	<input type="checkbox"/>	Other (Specify) _____
<input type="checkbox"/> 0	Aphids	<input type="checkbox"/>	Other (Specify) _____

16. ADDITIONAL INFORMATION ON ANY ITEM ABOVE, OR GENERAL COMMENTS:

15

Section Numbers Correspond to the Numbers of the Sections on the Form

#200700409

<p>4. EARLY PLANT GROWTH HABIT:</p>  <p>1 Prostrate 2 Intermediate 3 Erect</p>	<p>10. STEM INTERNODE X-SECTION:</p>  <p>1 Hollow 2 Semi-solid 3 Solid</p>	<p>11. SPIKE SHAPE:</p>  <p>1 Tapering 2 Oblong 3 Clavate 4 Elliptical</p>	
<p>11. AWNEDNESS:</p>  <p>1 Awnless 2 Apically Awnleted 3 Awnleted 4 Awned</p>	<p>12. BEAK SHAPE:</p>  <p>1 Obtuse 2 Acute 3 Acuminate</p>		
<p>12. SHOULDER SHAPE:</p>  <p>1 Wanting 2 Oblique 3 Rounded 4 Square 5 Elevated 6 Apiculate</p>			
<p>13. SEED SHAPE:</p>  <p>1 Ovate 2 Oval 3 Elliptical</p>	<p>13. CHEEK SHAPE:</p>  <p>1 Rounded 2 Angular</p>	<p>13. BRUSH SIZE</p>  <p>1 Small 2 Midsized 3 Large 4 Collared</p>	<p>13. BRUSH HAIR LENGTH:</p>  <p>1 Short 2 Medium 3 Long</p>
<p>13. GERM (EMBRYO) SIZE:</p>  <p>1 Small 2 Midsized 3 Large</p>	<p>13. SEED CREASE WIDTH:</p>  <p>1 Narrow 2 Mid-wide 3 Wide</p>	<p>13. SEED CREASE DEPTH:</p>  <p>1 Shallow 2 Mid-Deep 3 Deep</p>	

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EXHIBIT D
ADDITIONAL DESCRIPTION OF THE VARIETY

2007002409

MILLING AND BAKING QUALITY DATA (Table 2):

Included is the milling and baking data from the 2003-06 harvests. These data are from the harvest of a single replication from the sites described below. These data include four years of single year data. All grain quality was evaluated by The USDA/ARS Soft Wheat Quality Laboratory in Wooster Ohio.

Data Summary:

2006

Sampling size was 250gm from one replication at each location. The sites used were Lenawee and Saginaw Counties. The two samples were composited and sent for quality analysis.

2005

Sampling size was 250gm from one replication at each location. The sites used were Midland and Saginaw Counties. The two samples were composited and sent for quality analysis.

2004

Sampling size was 250gm from one replication at each location. The sites used were Lenawee and Sanilac Counties. The two samples were composited and sent for quality analysis.

2003

Sampling size was 250gm from one replication at each location. The sites used were Lenawee and Sanilac Counties. The two samples were composited and sent for quality analysis.

EXHIBIT D

Table 2: All grain quality was evaluated by The USDA/ARS Soft Wheat Quality Laboratory in Wooster Ohio.

NAME	Percent Flour Yield				Percent Flour Protein				Lactic Acid Retention			
	2006	2005	2004	2003	2006	2005	2004	2003	2006	2005	2004	2003
Red Ruby	70.9	71.8	70.5	71.8	7.0	8.5	6.8	8.9	112.3	104.6	117.7	102.7
Hopewell	68.5	69.8	68.7	70.6	7.1	8.9	7.1	9.0	119.9	106.9	113.0	108.9
TRIAL MEAN	70.4	71.7	70.7	71.1	7.2	9.0	6.9	8.9	104.9	98.4	104.1	103.0

NAME	Percent Softness Equivalent				Softness Equivalent Score				Cookie Diameter (cm)			
	2006	2005	2004	2003	2006	2005	2004	2003	2006	2005	2004	2003
Red Ruby	63.7	57.9	60.1	58.8	73.0	80.7	69.4	-----	18.7	17.8	18.5	18.5
Hopewell	62.9	57.5	59.4	59.6	70.7	79.3	67.7	-----	18.5	17.9	18.8	18.5
TRIAL MEAN	61.0	54.4	56.8	55.7	65.3	70.7	61.9	-----	18.3	17.8	18.4	18.1

NAME	Milling Quality Score				Baking Quality Score				Top Grain			
	2006	2005	2004	2003	2006	2005	2004	2003	2006	2005	2004	2003
Red Ruby	70.6	72.2	70.1	76.1	71.3	71.7	53.3	71.0	4.0	4.0	5.0	4.0
Hopewell	58.3	62.0	61.0	70.0	63.0	74.0	60.3	71.5	4.0	4.0	6.0	5.0
TRIAL MEAN	68.1	71.6	71.3	72.5	58.0	71.1	50.2	60.5	4.4	3.9	5.6	3.7

NAME	Quality Lab Test Weight				Test Weight Score			
	2006	2005	2004	2003	2006	2005	2004	2003
Red Ruby	61.1	64.4	63.0	62.9	62.5	62.0	69.5	-----
Hopewell	60.7	63.9	62.3	61.5	58.9	57.5	63.7	-----
TRIAL MEAN	60.4	64.0	62.6	61.9	56.7	58.3	66.7	-----

200760409

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE**EXHIBIT E**
STATEMENT OF THE BASIS OF OWNERSHIP

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). The information is held confidential until the certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) Michigan State University	2. TEMPORARY DESIGNATION OR EXPERIMENTAL NUMBER E1007R	3. VARIETY NAME Red Ruby
4. ADDRESS (Street and No., or R.F.D. No., City, State, and ZIP, and Country) 2727 Alliance Drive Lansing, MI 48910	5. TELEPHONE (Include area code) (517) 355-2186	6. FAX (Include area code) (517) 432-3880
7. PVPO NUMBER #200700409		

8. Does the applicant own all rights to the variety? Mark an "X" in the appropriate block. If no, please explain. ☒ YES ☐ NO9. Is the applicant (individual or company) a U.S. national or a U.S. based company? If no, give name of country. ☒ YES ☐ NO10. Is the applicant the original owner? ☒ YES ☐ NO If no, please answer one of the following:

a. If the original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. National(s)?

☐ YES ☐ NO If no, give name of country

b. If the original rights to variety were owned by a company(ies), is (are) the original owner(s) a U.S. based company?

☒ YES ☐ NO If no, give name of country

11. Additional explanation on ownership (Trace ownership from original breeder to current owner. Use the reverse for extra space if needed):

E1007R ("Red Ruby") is an inbred line created by Prof. Rick Ward and Mr. Lee Siler at Michigan State University. All selection and testing was conducted by MSU personnel. MSU is therefore the originating breeder and owner of E1007W ("Red Ruby").

PLEASE NOTE:

Plant variety protection can only be afforded to the owners (not licensees) who meet the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed the final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definitions.

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 0.1 hour per response, including the time for reviewing the instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, sexual orientation, marital or family status, political beliefs, parental status, or protected genetic information. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, D.C. 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0581-0055. The time required to complete this information collection is estimated to average 5 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, sexual orientation, marital or family status, political beliefs, parental status, or protected genetic information. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

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**U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MD 20705**

**EXHIBIT F
DECLARATION REGARDING DEPOSIT**

NAME OF OWNER (S) Michigan State University	ADDRESS (Street and No. or RD No., City, State, and Zip Code and Country) East Lansing, MI 48824	TEMPORARY OR EXPERIMENTAL DESIGNATION E1007R VARIETY NAME Red Ruby
NAME OF OWNER REPRESENTATIVE (S) Michael R. Poterala Executive Director Office of Intellectual Property	ADDRESS (Street and No. or RD No., City, State, and Zip Code and Country) East Lansing, MI 48824	FOR OFFICIAL USE ONLY PVP NUMBER #200700409

I do hereby declare that during the life of the certificate a viable sample of propagating material of the subject variety will be deposited, and replenished as needed periodically, in a public repository in the United States in accordance with the regulations established by the Plant Variety Protection Office.


 Signature

8-3-2007
 Date